

INFRARED SPECTROPHOTOMETRY OF SATURN'S RINGS

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We initiated an observational campaign of mid-infrared spectrophotometry of Saturn's main rings from the 1995 Earth - Saturn ring plane crossings epoch. We acquired data at the NASA/InfraRed Telescope Facility (IRTF) from 1995 to 2002 with MIRLIN, a 10- μm camera at several diagnostic wavelengths in the 8- to 24- μm spectral window. Our observational program has, therefore, covered one fourth of a Saturnian year and followed the progressive march of the rings from their edge-on presentation at the equator in 1995 to their maximum opening, obscuring the northern pole of Saturn.

Our specific scientific objectives were to determine the thermal inertia, temperature and opacities of the rings; and thermal asymmetries between the East and West ansae. Our preliminary results indicate that the brightness temperature of the rings peaks near 18 μm . There also exists an asymmetry between the East and West ansae of few (2) degrees, independent of the observing epoch. This is similar to the near-infrared albedo asymmetry between the ansae and reflectivities at visible wavelengths. Our current efforts are aimed at modelling the ring opacities in the mid-infrared as function of changes in solar elevation angle, inclination and phase angles of the rings. These models will be validated against previous data sets acquired by Voyager and ISO and data to be acquired by Cassini and possibly SIRTf and SOFIA.